HEAT SINK SYSTEM

Prior Applications

Priority is claimed from provisional application number 60/396,434 filed 07/16/2002.

Federally Sponsored Research

No federal sponsorship or funding was used to develop the subject matter of this application.

Background of the Invention

[0001] Amateur radios use power transistors and other components which generate heat that can result in failure of the component and/or other adjacent components. In order to dissipate the heat, an external heat sink has traditionally been used. However, high powered radios in excess of 25 watts of transmitting power, require an extremely large heat sink. This makes such a radio virtually unmarketable for mobile use, where size of the radio is a definite factor in the minds of purchasers.

Summary of the Invention

[0007] An object of the invention is to provide a means for reducing the size of an external heat sink in high powered transceivers.

[0009] This is accomplished through the use of spacers to connect the component to be cooled with the heat sink. The spacers are generally cylindrical in shape and of a predetermined dimension such that there is at least a two millimeter gap created between the heat sink and the PC

board to which other electronic components are mounted. A fan is used to direct air into the two millimeter or larger space created by the spacers between the heat sink and the part to be cooled. The fan directs cooling air over the base of the heat sink and across the thermal conducting spacers. The heat sink also has radiating fins which are cooled by external air flow.

[0015] The use of a cooling fan to cool the heat sink results in airflow throughout the interior of the transceiver case. This can cause dirt, dust or contaminants to be deposited onto components. The deposit of dirt, dust or contaminants can result in premature failure of the components. A further objective of the present invention is to reduce the deposit of dirt on components of the transceiver not being cooled by the heat sink system.

[0020] This is accomplished through the use of a shield around the PC board upon which the part to be cooled is mounted. In the preferred embodiment, the shield completely surrounds the part to be cooled, and the printed circuit board on which said part is mounted, thereby preventing air from the cooling fan from flowing onto parts that are not intended to be cooled by the heat sink system. In addition, a plate is installed over one half of the radiating fins in direct relation to the cooling fan which reduces the amount of dirt, dust and contaminants taken in and then dispersed by the fan. It also provides a measure of protection against injury in that it reduces the risk of contact with the blades of the fan.

[0028] An additional benefit of the shield is the channeling of airflow from the fan over the spacers. This results in increased cooling efficiency.

[0030] An additional benefit of the shield is the prevention of unwanted radio frequency interference by the parts being cooled. The shield can be made of an RF absorbing material such as nickel-zinc.

[0033] In another embodiment, the shield can be made without a top. The printed circuit board is disposed over the shield. This allows for channeling of the airflow in the space created by the spacers and prevents dirt and contaminants from flowing onto other nearby components.

Brief Description of the Drawings

[0036] Figure A is a cross sectional view of the heat sink system according to the preferred embodiment of the present invention.

[0038] Figure B is a perspective view of the heat sink system according to the preferred embodiment of the present invention.

Detailed Description of the Invention

[0040] The preferred embodiment of the present invention will be described with reference to Figure A.

[0042] In Figure A, a cross section of the invention is seen. The component to be cooled is isolated to a printed circuit board separated from those components which need not be cooled but are intended to be protected from dirt, dust and contaminants. The component to be cooled is attached to a heat sink by means of spacers. The spacers may be made of aluminum, copper or other thermal conducting material. The spacers create a space between the component to be cooled and the heat sink.

[0048] The heat sink consists of a base with a top and bottom surface. The spacers are connected to the top surface of the heat sink. Radiating fins project from the bottom surface of the heat sink base and are cooled by external air. The base of the heat sink has a first opening off center

of sufficient size for a motor and fan assembly to be installed. A motor is mounted to the opening. A fan is operatively connected to the motor such that air is forced by the fan into the space created by the spacer between the base and the component to be cooled. The heat sink base also has a second opening, off center and opposite of center to the first opening, through which air may be exhausted to the exterior environment.

[0056] The fan when operating should be installed such that external air is drawn into the first opening created in the base of the heat sink and flows over the top base of the heat sink through the space created by the spacers. The heated air is then exhausted through the second opening.

[0059] A shield is installed around the printed circuit board upon which is mounted the part to be cooled. The shield should have at least one side wall and a top wall. In the preferred embodiment there are four side walls with each side wall connected to the top wall and the heat sink.